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Fear of Crime and the Neighbourhood Context in Canadian Cities

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by Robin Fitzgerald, Statistics Canada

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Abstract

The purpose of this research paper was to examine whether the chances of experiencing fear of crime varied across Canadian urban neighbourhoods, and whether factors associated with individuals and their neighbourhoods explained this variation.

In addition, the study aimed to understand how Canadians' perceptions of neighbourhood crime and disorder influenced their chances of experiencing fear. Analyses were based on data from the 2004 General Social Survey (GSS) on Victimization and the 2001 Census.

Multilevel regression modelling techniques were employed in order to address the statistical complications that arise when individuals are clustered within larger units such as neighbourhoods.

The results showed that while the characteristics and perceptions of individuals were most important in explaining differences in fear among urban Canadians; a statistically significant portion of the variation in fear was attributable to the neighbourhood environment.

Introduction

Numerous studies have observed that the negative consequences of crime extend beyond crime victims themselves (Gardner 2008; Sacco 1995). In particular, fear of crime has been identified as a widespread social problem that can influence individuals' health and well-being, and at a broader level, can influence the quality of life in local communities by limiting interaction and trust among residents (Conklin 1975; Ross 1993; Skogan 1990).

Much of the current Canadian research has been aimed at understanding the characteristics of individuals who are at greatest risk of experiencing fear of crime. A consistent finding in this work is that, on average, women and older Canadians report higher levels of fear in local communities (Sacco 1995). Other research suggests that women and older people experience higher levels of fear of crime regardless of income, education, or personal experiences of victimization (Garofalo and Laub 1978).

More recently, research on American cities suggests that it may also be important to consider the neighbourhood context in attempting to understand patterns of fear of crime in Canada for two reasons. First, some aspects of the social and economic conditions of neighbourhoods may be directly related to individuals' behaviours and perceptions, regardless of their own personal characteristics (Sampson, Raudenbush and Earls 1997). Second, individuals' **perceptions** of the level of crime and 'social disorder' in the neighbourhood, (i.e., perceived signs of 'incivilities' such as prostitution, drug addicts, loitering, vandalism, etc.), may explain variations in levels of fear even after accounting for neighbourhood and individual characteristics (Wyant 2008).

The aim of this study is to present information about the extent to which fear of crime differs across neighbourhoods in Canadian urban areas, and to assess whether the characteristics of individuals and/or neighbourhoods explain this variation.

Using data from the 2004 General Social Survey (GSS) on Victimization and the 2001 Census, this study addresses these issues by taking into account information about both the individual- and neighbourhood-level at the same time. This is accomplished through multilevel regression modelling techniques, a necessary strategy to address the statistical complications that arise when individuals are clustered within larger units such as neighbourhoods (see 'Multilevel analysis' in the Methodology section).

Findings

Defining fear of crime in the neighbourhood

Fear of crime refers to the fear, rather than to the actual likelihood, of being a victim of crime. The concept is typically measured as one's perceived level of safety in different situations, for example, in the home, the community or on public transportation. This study relies on a measure of fear of crime that most closely approximates the notion of fear of crime within one's neighbourhood.

The 2004 GSS asked respondents how safe they felt from crime while walking alone in their areas after dark. Possible responses included very safe, reasonably safe, somewhat unsafe, or very unsafe. For the purposes of this study responses were divided into two categories such that experiencing fear of crime was represented by feeling somewhat or very unsafe, and not experiencing fear of crime was represented by feeling very or reasonably safe. Among the population of urban Canadians aged 15 years and older considered in this study, 18% (representing about 3 million Canadians) indicated that they experienced fear of crime while walking alone in their areas after dark, while the majority (82%) indicated that they did not experience fear of crime in these conditions.

Who reported fear of crime in the neighbourhood?

Urban residents' reports of fear of crime in the neighbourhood were patterned by a number of socio-demographic characteristics (Table 1). Most notably, the percentage of women who reported feeling somewhat or very unsafe while alone in their neighbourhoods after dark was 3.6 times higher than the percentage for men. This finding is consistent with results from the 1993 and 1999 cycles of the GSS on victimization (Besserer and Trainor 2000; Sacco 1995).

Fear of crime in the neighbourhood was also more frequently reported by those in the lowest income quartiles, those with the lowest level of education (less than secondary), and those in the oldest age group. A significantly greater proportion of those aged 65 years and older reported experiencing fear of crime in the neighbourhood than those aged 25 to 44 (the reference category). It should be noted, however, that this was not the case for other types of fear (not shown). For example, older Canadians were **less** likely to feel unsafe while they were alone in their homes at night than was the case for younger age groups, perhaps demonstrating their greater sense of vulnerability beyond the household (see Sacco 1995).

Reports of fear were also higher among those who reported having been victimized at least once in the past year (22%), than among those who did not report being victimized (16%). However, it is notable that the majority (78%) of victims did not report that they experienced fear of crime. Finally, fear was more frequently reported by individuals who also viewed their neighbourhoods to be higher risk environments. That is, those who perceived that physical and/or social disorder were problematic in their neighbourhoods, or that crime was higher in their neighbourhoods than elsewhere (see 'Description of variables' in the Methodology section) were also more likely to have reported that they experienced fear of crime in their neighbourhoods than those who did not hold these views.

Table 1

Proportion reporting fear of crime[1] among urban Canadians aged 15 years and older

	Proportion of each group reporting that they felt somewhat or very unsafe from crime in the neighbourhood
	percentage
Sex	
Female	28.7 ***
Male[2]	8.0
Age	
15 to 24 years	18.9
25 to 44 years[2]	15.7
45 to 64 years	18.1
65 years and older	24.3 ***
Total household income quartiles	
Lowest income quartile	25.5 ***
Second income quartile	17.4 ***
Third income quartile	13.6
Fourth income quartile[2]	10.1
Missing[3]	22.3 ***
Education	
Less than secondary	24.6 ***
Secondary	18.8
Some post-secondary	17.3
Post-secondary degree or diploma[2]	15.5
Visible minority status	
Visible minority	19.9
Non-visible minority[2]	17.4
Victimized in past year	
Yes	21.7 ***
No[2]	16.1
Physical disorder a problem in the neighbourhood	
Yes	33.8 ***
No[2]	14.8
Social disorder a problem in the neighbourhood	
Yes	32.2 ***
No[2]	13.1
Crime is higher here than other neighbourhoods	
Yes	42.2 ***
No[2]	15.0

*** statistically different from the reference category $p \leq 0.001$

1. Fear of crime is defined as "feeling very or somewhat unsafe while walking alone in your area after dark".
2. Reference group in models.
3. Missing 'total household income' information is included as a separate category in order to retain these individuals for analyses.

Source: Statistics Canada, General Social Survey, 2004.

Multilevel results

The remainder of this study examines the variation in fear of crime across Canadian urban neighbourhoods. The aim is to examine individual and neighbourhood characteristics associated with the probability of reporting fear of crime in the neighbourhood—where feeling unsafe while walking alone in one's neighbourhood after dark is coded as 1, and feeling safe is coded as 0. Results are based on a multilevel logistic regression analysis of fear of crime. Further explanation of this technique and the interpretation of probabilities and odds ratios are presented in the 'Multilevel analysis' and 'Odds ratio' portions of the Methodology section.

Does fear of crime vary significantly between urban neighbourhoods in Canada?

Table 2 provides an estimate of the extent to which fear of crime varied across Canadian urban neighbourhoods. This model is often referred to as the 'empty' model since it contains no explanatory variables, but is intended to estimate the proportion of total variation in fear of crime that was related to differences between neighbourhoods rather than differences between the individuals residing in those neighbourhoods (see 'Intraclass correlation coefficients' in the Multilevel analysis portion of the Methodology section).

Table 2

Multilevel logistic regression (empty) models—Estimation of neighbourhood variance components for fear of crime

	Fear of crime in neighbourhood	
	odds ratio	(95% CI[1])
Intercept		
Average neighbourhood odds ratio	0.22***	(0.21, 0.23)
Neighbourhood-level variance component[2]	0.45***	...
Intraclass correlation (ICC)[3]	0.12	...

... not applicable

*** $p \leq 0.001$

1. Confidence interval.
2. Variance component refers to the variance between neighbourhoods in the neighbourhood-average odds ratio of fear of crime.
3. ICC or the percentage of total variance in outcomes associated with the neighbourhood was approximated as: neighbourhood variance/(neighbourhood variance + $\Pi^2/3$) (Snijders and Bosker 1999) (see 'Multilevel analysis' in the Methodology section).

Note: Based on a sample of 12,396 respondents nested within 3,952 neighbourhoods.

Sources: Statistics Canada, General Social Survey, 2004 and Census, 2001.

The results for this model indicated that fear of crime did vary significantly across neighbourhoods since the neighbourhood variance component was greater than 0 and was statistically significant ($p \leq 0.001$). About 12% of the total variation in fear of crime could be attributed to differences between neighbourhood contexts. This figure is consistent with studies in the U.S. (Wyant 2008; Taylor 1997) and Sweden (Lindstrom et al. 2003) where the proportion of total variation in fear of crime attributable to the neighbourhood-level ranged from 6 to 12 percent.

As is often the case in research studying neighbourhood effects on individual outcomes, the variation in fear of crime was not completely explained by neighbourhood-level variables, rather more of it was attributable to individual-level differences (88%). Nonetheless, the empty model results in this study indicated that the neighbourhood variation was statistically significant and consequently important to consider when attempting to understand factors related to fear of crime in the Canadian urban setting (Wyant 2008).

The empty model also provided an estimate of the average probability of fear of crime across all neighbourhoods. In this case, the likelihood of feeling unsafe was relatively low in the "typical" urban neighbourhood in Canada, corresponding to an average probability of about 18%.[1] However, this figure varied significantly across neighbourhoods. Roughly 95% of all neighbourhoods in the study were predicted to have between 5% and 45% of individuals reporting fear of crime in their neighbourhoods.

How much of the variation in fear of crime between neighbourhoods is explained by the characteristics of individuals?

It is reasonable to assume that at least part of the observed variation in neighbourhood fear could be explained by the characteristics of those who live there, and consequently, including these variables in the model should reduce the amount of variation between neighbourhoods (Willms 2002). The first model in Table 3 showed that the set of individual-level variables (excluding physical and social disorder) did explain part of the variation in fear across neighbourhoods; however, a large amount of this variation remained to be explained. The proportion of the total variation in fear of crime in the neighbourhood that was explained by one's neighbourhood context was reduced to 0.11 after accounting for individual characteristics, representing a 13% reduction from the empty model.

1. Table 2 shows that for a neighbourhood with a "typical" rate of fear of crime, the expected odds ratio of fear of crime is 0.22, corresponding to an expected log-odds of fear crime of, natural log (0.2165) = -1.53. This corresponds to an average neighbourhood probability of, 1/(1+exp(1.53)) = 0.178, or roughly, 18% (for further explanation see Raudenbush and Bryk 2002, 297).

Table 3

Individual and neighbourhood characteristics associated with variation in fear of crime across neighbourhoods

	Model 1		Model 2		Model 3	
	odds ratio	(95% CI[1])	odds ratio	(95% CI[1])	odds ratio	(95% CI[1])
Average neighbourhood odds ratio (intercept)	0.03***	(0.03, 0.04)	0.04***	(0.03, 0.04)	0.02***	(0.02, 0.03)
Individual characteristics						
Female	4.81***	(4.24, 5.46)	4.97***	(4.38, 5.64)	5.50***	(4.77, 6.34)
Age[2]						
15 to 24 years	0.95	(0.79, 1.14)	0.96	(0.80, 1.16)	0.94	(0.77, 1.16)
45 to 64 years	1.24**	(1.08, 1.42)	1.29**	(1.12, 1.47)	1.40***	(1.21, 1.62)
65 years and older	1.73***	(1.43, 2.09)	1.84***	(1.52, 2.23)	2.15***	(1.73, 2.66)
Total household income quartiles[2]						
Lowest income quartile	2.29***	(1.86, 2.83)	1.85***	(1.49, 2.29)	1.49**	(1.19, 1.88)
Second income quartile	1.71***	(1.38, 2.12)	1.52***	(1.22, 1.89)	1.37**	(1.08, 1.73)
Third income quartile	1.38**	(1.12, 1.71)	1.27*	(1.02, 1.57)	1.14	(0.91, 1.43)
Missing[3]	2.02***	(1.62, 2.51)	1.80***	(1.44, 2.25)	1.59***	(1.26, 2.02)
Education[2]						
Less than secondary	1.62***	(1.37, 1.91)	1.64***	(1.39, 1.95)	1.72***	(1.43, 2.07)
Secondary	1.11	(0.95, 1.31)	1.13	(0.95, 1.33)	1.26*	(1.06, 1.51)
Some post-secondary	1.05	(0.89, 1.24)	1.04	(0.88, 1.23)	1.07	(0.89, 1.29)
Visible minority status	1.16	(0.98, 1.38)	0.97	(0.81, 1.16)	1.11	(0.92, 1.34)
Victimized in past year	1.66***	(1.48, 1.87)	1.58***	(1.40, 1.78)	1.27**	(1.11, 1.45)
Physical disorder a problem	...	...	...	...	1.67***	(1.41, 1.98)
Social disorder a problem	...	...	...	...	1.94***	(1.66, 2.26)
Crime is higher here than other neighbourhoods	...	...	...	...	3.14***	(2.64, 3.74)
Neighbourhood characteristics[4]						
High percentage of low income families	...	...	1.80***	(1.54, 2.11)	1.56***	(1.32, 1.85)
High percentage of population aged 65 and older	...	...	1.01	(0.89, 1.14)	0.97	(0.85, 1.11)
High percentage of visible minority population	...	...	1.35***	(1.19, 1.53)	1.14	(0.99, 1.30)
High percentage of lone-parent families	...	...	1.16*	(1.00, 1.35)	1.05	(0.90, 1.23)
Low percentage of longer term residents	...	...	0.95	(0.83, 1.08)	0.92	(0.80, 1.05)
Low percentage of newer dwellings	...	...	0.98	(0.86, 1.11)	0.93	(0.81, 1.07)
Neighbourhood-level variance component[5]	0.39***	...	0.32***	...	0.25***	...
Intraclass correlation (ICC)[6]	0.11	...	0.09	...	0.07	...
				percentage		
Percentage reduction in the ICC from the empty model	13.0	...	27.0	...	41.0	...

... not applicable
* $p \leq 0.05$
** $p \leq 0.01$
*** $p \leq 0.001$

1. Confidence interval.
2. Reference categories for age = 25 to 44 years; total household income = fourth income quartile (highest); education = post secondary degree or diploma.
3. Missing 'total household income' information is included as a separate category in order to retain non-responding individuals for analyses.
4. Neighbourhood variables split at the median representing high and low proportions of the characteristics. (For definitions see 'Description of variables' in the Methodology section).
5. Variance component refers to the variance between neighbourhoods in the neighbourhood-average odds ratio of fear of crime.
6. ICC or the percentage of total variance in outcomes associated with the neighbourhood was approximated as: neighbourhood variance/(neighbourhood variance + $\pi^2/3$) (Snijders and Bosker 1999) (see 'Multilevel analysis' in the Methodology section).

Note: Analyses based on a sample of 12,396 respondents nested within 3,952 neighbourhoods.

Sources: Statistics Canada, General Social Survey, 2004 and Census, 2001.

This model also shows estimates for the odds ratios associated with each of the individual-level variables. These represented the average odds ratio for each variable across all neighbourhoods in the study. Consistent with the bivariate proportions shown in Table 1, sex, age, income and education were associated with fear of crime in the neighbourhood. Notably, after accounting for the other variables, women were much more likely to report experiencing fear than men—their odds were nearly five times higher than the odds for men.

The chances of experiencing fear in the neighbourhood were also greater for older Canadians. For example, the odds of someone aged 65 years or older reporting fear were 73% higher than for someone aged 25 to 44 years. Lower income and education levels were also associated with higher chances of fear. For example, the odds of experiencing fear were over two times higher for those in the lowest quartile of household income than those in the highest quartile, while those who had not finished high school faced greater odds than those with post-secondary degree or diploma.

There were no statistically significant differences in the chances of experiencing fear of crime between those who identified themselves as belonging to a visible minority group and those who did not.

Finally, those who reported being a victim of crime at least once in the past 12 months were also at a higher risk of experiencing fear than those who did not report being victimized, when holding constant the other characteristics.

Are neighbourhood conditions associated with fear of crime?

The second model in Table 3 assessed whether the variation in fear of crime could be explained by the socio-economic, residential and dwelling features of the neighbourhoods, over and above the characteristics of individuals living in these neighbourhoods. More specifically, the goal in this model was to investigate whether adding the neighbourhood-level variables would account for some of the unexplained variability observed in the first model. The neighbourhood variables were measured using a different source of information, the 2001 Census, aggregated to the neighbourhood-level. These variables were represented as two-category variables split at the median, indicating a high or low level of the characteristic, depending on the variable as described in the 'Description of variables' portion of the Methodology section.

The results showed that three neighbourhood characteristics were significantly associated with the likelihood of reporting fear of crime: higher proportions of low income families, visible minority residents, and lone-parent families. Thus, net of the other variables, the odds of reporting fear of crime were 80% higher for those living in neighbourhoods with higher proportions of low income families than those living in neighbourhoods with lower proportions. Those living in neighbourhoods with higher proportions of residents indicating that they belonged to visible minority groups were 35% more likely to experience fear of crime than those living in neighbourhoods with lower proportions, and residents of neighbourhoods with higher proportions of lone-parent families were 16% more likely to report fear than their counterparts living in neighbourhoods with a lower proportion of lone-parent families.

Other neighbourhood characteristics were not associated with a higher likelihood of reporting fear of crime including the proportion of older Canadians, the proportion of newer dwellings built within the past 10 years, and the proportion of longer term residents who lived at the same residence five years prior to the 2001 Census.

The addition of neighbourhood-level variables in this model also had a relatively minor influence on the strength of the relationship between individual-level variables and fear of crime. Although there were some changes in the odds ratios—most notably, a 20% reduction in the chances of someone in the lowest income quartile reporting that they experienced fear of crime—the association of individual-level variables with fear of crime remained significant after controlling for neighbourhood factors. Above all, women continued to face much higher chances of experiencing fear irrespective of the neighbourhood conditions.

How much of the variation in fear between neighbourhoods is explained by the characteristics of neighbourhoods?

The influence of the neighbourhood-level variables is somewhat larger than the individual-level variables in explaining the variance in fear between neighbourhoods. In other words, Model 2 indicates that between-neighbourhood variation in fear of crime is due more to neighbourhood factors than to individual factors. In this case, after adding the neighbourhood-level variables the reduction from the empty model in the proportion of the total variation in fear of crime that was explained by the neighbourhood-level was 27%, compared to 13% for the individual-level model. Nevertheless, despite the statistically significant contributions of variables measuring the proportion of low income families, visible minorities and lone-parent families, a considerable amount of the total variation in fear of crime was left unexplained in the model, suggesting that the neighbourhood differences in levels of fear are not totally captured by the socio-economic conditions in those places.

How does individual perception of neighbourhood disorder and crime influence fear?

The way people view the level of risk in their local environments may have the most important influence on their chances of reporting fear of crime. Research evidence suggests that fear is strongly associated with one's perception of crime and disorder in the neighbourhood (LaGrange et al. 1992). In addition, however, researchers have observed that these perceptions may influence levels of fear regardless of the other characteristics of individuals or the socio-economic conditions in their neighbourhoods (Wyant 2008).

The third model in Table 3 added the three variables measuring perceived neighbourhood risk (i.e., physical disorder, social disorder and relative neighbourhood crime level) to the multilevel model in order to test the following two possibilities. First, individuals' reports of problematic disorder and high relative crime levels would have an independent effect on their chances of experiencing fear of crime net of the individual- and neighbourhood-level variables measured in the previous model. Second, individuals' reports of neighbourhood disorder and crime would make neighbourhood socio-economic characteristics insignificant predictors of fear

of crime. As an example, the strength of the relationship between living in a low-income neighbourhood and someone's chances of experiencing fear of crime would be reduced if he or she perceived that the neighbourhood was a high risk environment.

The model showed that individuals' perceptions of risk in the neighbourhood did have independent effects on their chances of experiencing fear. After accounting for the other variables, the odds were about 67% higher for those who reported that physical disorder was a problem, and 94% higher for those who reported that social disorder was a problem. Those who felt that their neighbourhood had higher amounts of crime than other areas showed odds of experiencing fear over three times higher than those who felt that their neighbourhood had the same or lower crime than other neighbourhoods.

Finally, after adding the three perceived risk variables, there was a reduction in the strength of the relationship between fear and the neighbourhood-level socio-economic variables identified in the second model. The association between fear and living in a neighbourhood with high proportions of visible minority and lone-parent populations became statistically non-significant. Although the relationship between fear and living in a neighbourhood with a high proportion of low-income families was reduced by about 13% (1.80 - 1.56/1.80), the odds ratio remained statistically significant.

These results suggest that while neighbours' perceptions of risk in the neighbourhood account for some of the observed association between neighbourhood structural characteristics and fear of crime, neighbourhood low-income also has independent effects that directly influence fear.

Conclusion

The purpose of this study was to examine whether the chances of experiencing fear of crime varied across Canadian urban neighbourhoods, and whether factors associated with individuals and their neighbourhoods explained this variation. In addition, the study aimed to understand how Canadians' perceptions of neighbourhood crime and disorder influenced their chances of experiencing fear.

Based on data from the 2004 General Social Survey and the 2001 Census, the results indicated that in a typical neighbourhood about 18% of residents aged 15 years and older reported feeling very or somewhat unsafe while alone in their neighbourhoods after dark. However, there was significant variation among neighbourhoods in this figure, with 95% of neighbourhoods having between 5% and 45% of residents reporting fear of crime.

The results also showed that there were a number of individual-level demographic characteristics that were associated with the likelihood of experiencing fear. Most notably, women were much more likely to express feeling unsafe in their neighbourhoods than were men. This result persisted even after taking into account neighbourhood socio-economic conditions, personal experiences of victimization, and individuals' perceptions of disorder and crime in the neighbourhood. This finding is consistent with research examining gender differences in fear of crime, and suggests that future research needs to look more closely at differences in the root causes of fear for men and women (Schafer et al. 2006).

Some of the socio-economic and demographic conditions of neighbourhoods examined in this study were associated with higher chances of experiencing fear. These independent neighbourhood effects on fear were observed in places with higher proportions of low income families, visible minority populations, and lone-parent families. The relationship between these neighbourhood characteristics and fear held over and above the characteristics of individuals.

The study also investigated how individuals' own views about the level of risk in their neighbourhoods influenced their likelihood of experiencing fear. These results showed that neighbours' perceptions of crime and physical and social disorder were independently associated with fear of crime irrespective of individual or neighbourhood characteristics. Moreover, these perceptions served to reduce the strength of the relationship between the neighbourhood variables (i.e., high proportions of low income families, visible minority population and lone-parent families) and fear. In line with other research, this result suggests that the effect of the neighbourhood variables such as the ones examined in this study is at least partially shaped by individuals' perceptions of the local environment (LaGrange et al. 1992; Wyant 2008).

Finally, the results in this study suggest that to better understand differences in experiences of fear of crime it is necessary to consider both individuals and the places in which they live. Ultimately, individual-level characteristics and perceptions were most important in explaining differences in fear among urban Canadians; however, a statistically significant portion of the variation in fear was attributable to the neighbourhood environment. The results also suggest that there are features of neighbourhood areas beyond the socio-economic and demographic characteristics of the residents that might explain the observed variation in levels of fear. Research on neighbourhood effects linked to individuals' experiences of crime and victimization have pointed to the importance of neighbourhood features such as the quality and extent of social interaction among residents, the level of police-reported crime, and the type of land-use in the local area (Sampson, Raudenbush and Earls 1997). Future work examining neighbourhood explanations of fear of crime would benefit from the addition of independent sources of data that measure factors such as these.

Methodology

Data sources

The data for this study come from two sources: the 2004 General Social Survey (GSS) and the 2001 Statistics Canada Census. In 2004, as part of the GSS program, Statistics Canada conducted a fourth survey cycle on victimization and public perceptions of crime and the justice system. The target population of the 2004 GSS included all people aged 15 and over, except full-time residents of the Yukon, Nunavut, and the Northwest Territories, and full-time residents of institutions. Data were collected each month from January to December 2004.

The 2001 Census provides the most recently available population and dwelling counts for Canada and also for smaller geographic units such as cities and areas within cities. The detailed socio-economic data used in this study are derived from the long form of the Census, which is based on a 20% sample of households. These data exclude the institutional population, which includes individuals living in hospitals, nursing homes, prisons and other institutions.

Definition of neighbourhoods

This study is concerned with the influence of neighbourhood environments on individual experiences of fear of crime. While there are numerous methods of defining the geographic boundaries that make up neighbourhoods, for the purposes of this study, Statistics Canada census tracts are used to approximate neighbourhoods. Census tracts are small, relatively stable geographic areas averaging about 2,500 to 8,000 residents. They are located in large urban centres with populations of 50,000 or more. Census tracts are reasonable representations of local perceptions of urban neighbourhoods since their boundaries are determined by committees of local specialists, for example, planners, health workers, and educators, in conjunction with Statistics Canada. An important consideration in determining census tract boundaries is that the residential population of the area is as homogeneous as possible with respect to socio-economic characteristics (Statistics Canada 2003, 249).

Sample size

The analyses presented in this study are based on respondents residing in large urban centres, with populations of 50,000 or more, in the 10 provinces. The analytic sample was composed of over 12,300 respondents representing about 15 million Canadians, living within approximately 3,900 census tracts.

Description of variables

Outcome variable

Fear of crime in the neighbourhood: Respondents were asked how safe they felt from crime while walking alone in their area after dark. Possible responses included very safe, reasonably safe, somewhat unsafe or very unsafe. A two-category outcome variable was created so that somewhat or very unsafe = 1, and very or reasonably safe = 0.

Individual-level variables

Sex of the respondent: A two-category variable where women = 1, and men = 0 (reference category).

Age: Four categories included 15 to 24, 25 to 44 (reference category), 45 to 64 and 65 years and older.

Total household income: Included an estimate of the total income, before deductions, of all household members from all sources during the past 12 months. Data were analyzed by income quartiles where the fourth (highest) income quartile was the reference category.

Education: Four categories included non-completion of secondary school, secondary school completion, some post-secondary school, and completion of a post-secondary degree or diploma (reference category).

Visible minority status: A two-category variable where visible minority = 1, and non-visible minority = 0 (reference category). The definition is based on the concept of "visible minority" in the *Employment Equity Act* applying to those who identified themselves as being non-Caucasian in race or non-white in colour. Under this definition non-visible minority included those who identified themselves as single origin White, single origin Aboriginal, multiple origins White/Latin American or White/Arab-West Asian.

Victimized in past year: A two-category variable where being the victim of one or more crimes in the past 12 months = 1, and not being a victim = 0 (reference category). Includes all forms of criminal victimization including cases where the spouse or ex-spouse was the offender.

Physical disorder a problem in the neighbourhood: Respondents were asked two questions about their neighbourhood physical environments: How much of a problem are (1) garbage and litter lying around? (2) vandalism, graffiti and other deliberate damage to property or vehicles? Possible responses included a very big problem, a fairly big problem, not a very big problem, or not a problem at all. A two-category variable was created such that 1 = either type of physical disorder was a fairly or very big problem, 0 = both types of physical disorder were not a very big problem or were no problem at all.

Social disorder a problem in the neighbourhood: Respondents were asked seven questions about their neighbourhood social environments: How much of a problem are (1) noisy neighbours or loud parties? (2) people hanging around on the streets? (3) people sleeping on the streets or in other public places? (4) people being attacked or harassed because of their skin colour, ethnic origin or religion? (5) people using

or dealing drugs? (6) people being drunk or rowdy in public places? (7) prostitution? Possible responses included a very big problem, a fairly big problem, not a very big problem, or not a problem at all. A two-category variable was created such that 1 = any type of social disorder was a fairly or very big problem, 0 = all types of social disorder were not a very big problem or were no problem at all.

Crime is higher than other neighbourhoods: Respondents were asked if compared to other areas in Canada, they thought that their neighbourhood had a higher amount of crime, about the same or a lower amount of crime. A two-category variable was created where 1 = a high amount of crime, and 0 = about the same or a lower amount of crime.

Neighbourhood-level variables

Variables describing the neighbourhood context were based on Statistics Canada Census measures of the percentage of socio-economic, demographic and dwelling characteristics in the population. In the analyses, each Census variable was represented by a two-category variable split at the median across all neighbourhoods, indicating high or low levels of the characteristic.

Exploratory analyses using more than two categories for these neighbourhood variables showed no meaningful or statistically significant differences in fear of crime across other levels of the variables. Consequently, a median split was used for ease of interpretation in this study.

High proportion of low-income families: A two-category variable where 1 = neighbourhoods with a proportion of persons in low-income families that was **above** the median proportion for all neighbourhoods, and 0 = neighbourhoods with a proportion below the median. Low income refers to families who spend 20% more of their disposable income than the average family on food, shelter and clothing. Statistics Canada's low-income cut-offs (LICOs) are income thresholds that vary according to family and community size. Although LICOs are often referred to as poverty lines, they have no official status as such.

High proportion of persons aged 65 years and older: A two-category variable where 1 = neighbourhoods with a proportion of older Canadians that was **above** the median proportion for all neighbourhoods, and 0 = neighbourhoods with a proportion below the median.

High proportion of visible minorities: A two-category variable where 1 = neighbourhoods with a proportion of persons identifying themselves as visible minorities that was **above** the median proportion for all neighbourhoods, and 0 = neighbourhoods with a proportion below the median. (See definition of visible minority person mentioned previously in this section).

High proportion of lone-parent families: A two-category variable where 1 = neighbourhoods with a proportion of lone-parent families that was **above** the median proportion for all neighbourhoods, and 0 = neighbourhoods with a proportion below the median.

Low proportion of longer-term residents: A two-category variable where 1 = neighbourhoods with a proportion of residents living at the same address 5 years earlier that was **below** the median proportion for all neighbourhoods, and 0 = neighbourhoods with a proportion above the median.

Low proportion of newer dwellings: A two-category variable where 1 = neighbourhoods with a proportion of dwellings built within the last 10 years that was **below** the median proportion for all neighbourhoods, and 0 = neighbourhoods with a proportion above the median.

Multilevel analysis

The aim of this study is to investigate whether at least part of the differences in fear of crime among people may be attributable to the areas in which they live. Neighbours may share similar socio-economic and demographic characteristics, resources and experiences. Consequently, it is reasonable to assume that residents of one neighbourhood may be more similar to each other with respect to their levels of fear when alone at night in the area than to residents of other neighbourhoods.

Statistically, it is necessary to use techniques that consider the possible dependence of individuals clustered in the same area. Conventional regression analysis techniques assume that individual observations are independent from one another, if this assumption is violated estimates of the regression coefficients can be biased and standard errors may be underestimated. Multilevel regression techniques make it possible to take into account the possible dependence of the outcome variable between people in the same neighbourhood (Raudenbush and Bryk 2002; Snijders and Bosker 1999).

In this study, a series of multilevel logistic regression models were estimated to investigate variation in the chances of experiencing fear of crime among individuals clustered within neighbourhoods. First, the 'empty' model (i.e., containing no explanatory variables) provided an estimate of the expected probability of fear of crime for someone with nationally average background characteristics, as well as an estimate of how much variation in fear of crime existed between neighbourhoods (see Intraclass correlation below). In the second stage of analysis, a model assessed whether neighbourhood variation in fear of crime was associated with individual characteristics. And in the final stage of analysis, two models assessed whether neighbourhood level factors were associated with the chances of experiencing fear over and above the influence of individual-level factors.

Intraclass correlation coefficients (ICC) were calculated for each model. The ICC indicates the proportion of the total variance in the outcome variable, fear of crime, that is explained by the neighbourhood-level and is equal to the variance between neighbourhoods divided by the sum of the between-neighbourhood variance and the individual-level variance (Raudenbush and Bryk 2002, 72). In multilevel logistic regression models the ICC is approximated as the between-neighbourhood variation divided by the sum of between-neighbourhood variance and $\pi^2/3$ (Snijders and Bosker 1999).

Possible ICC values range from 0 to 1 where 0 would indicate that no respondents share common neighbourhood-level chances of reporting fear of crime, and 1 would indicate that 100% of the respondents in each neighbourhood share chances of reporting fear of crime. Thus, an ICC value less than 0.5 indicates that there is greater variability within neighbourhoods than between neighbourhoods, while a value greater than 0.5 indicates that there is greater variability between neighbourhoods than within them. An ICC value of 0 would indicate that single-level, rather than multilevel analysis, is justified.

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Odds ratio

When an outcome variable for a regression model has two categories, for example, feeling unsafe in your area while alone after dark versus feeling safe, researchers are interested in determining the probability of the occurrence of that event under a particular set of circumstances, for example, having low income, being female, or having been victimized in the past year. In this case logistic regression is the most appropriate technique to use. An odds ratio is a statistic generated by a logistic regression and can be used to assess whether, other things being equal; people with specific characteristics are more or less likely to report experiencing fear of crime than those in another group, referred to as the reference category.

For example, if we consider the risk of experiencing fear for a woman in comparison to a man (the reference category), an odds ratio near 1.0 implies there is no difference in fear between the two groups; an odds ratio less than 1.0 implies those in the group being considered (i.e. women) are less likely to experience fear than those in the reference group (i.e. men) and an odds ratio greater than 1.0 implies those in the group being considered are more likely to experience fear than those in the reference category.

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Appendix

Table A.1
Descriptive statistics for the variables in the study

	Mean	Standard deviation	Minimum number	Maximum number
Individual-level variables				
Somewhat/very unsafe in neighbourhood	0.18	0.39	0	1
Female	0.51	0.50	0	1
Age				
15 to 24 years	0.17	0.34	0	1
25 to 44 years[1]	0.38	0.49	0	1
45 to 64 years	0.30	0.47	0	1
65 years and older	0.14	0.37	0	1
Total household income quartiles				
Lowest income quartile	0.21	0.44	0	1
Second income quartile	0.17	0.38	0	1
Third income quartile	0.23	0.41	0	1
Fourth income quartile[1]	0.16	0.34	0	1
Missing[2]	0.23	0.41	0	1
Education				
Less than secondary	0.18	0.38	0	1
Secondary	0.15	0.36	0	1
Some post-secondary	0.18	0.37	0	1
Post-secondary degree or diploma[1]	0.49	0.50	0	1
Visible minority status	0.16	0.33	0	1
Victimized in past year	0.30	0.46	0	1
Physical disorder a problem in the neighbourhood	0.15	0.36	0	1
Social disorder a problem in the neighbourhood	0.22	0.42	0	1
Crime is higher than other neighbourhoods	0.11	0.31	0	1
Neighbourhood-level variables[3]				
Percentage of residents at same address 5 years earlier	56.10	12.79	0	84
Percentage of dwellings built in the past 10 years	14.37	18.65	0	100
Percentage of low income families	17.81	11.78	0	79
Percentage of population aged 65 and older	12.33	6.47	0	62
Percentage of visible minority population	16.45	18.98	0	97
Percentage of lone parent families	19.59	8.79	0	59

... not applicable
0 true zero or a value rounded to zero
1. Reference categories.
2. Missing 'total household income' information is included as a separate category in order to retain non-responding individuals for analyses.
3. For analyses neighbourhood-level variables split at the median representing high and low proportions of the characteristics. (For definitions see 'Description of variables' in the Methodology section).

Note: Results based on a sample of 12,396 respondents nested within 3,952 neighbourhoods.

Sources: Statistics Canada, General Social Survey, 2004 and Census, 2001.

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